Drowning Encyclopedia Article

Drowning

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Drowning

Drowning refers to **death** that is caused by fluid obstruction of the airway, usually by immersion in water. The main physiological consequence of immersion in water is hypoxemia; a lowered level of oxygen in the **blood**.

Drowning is the culmination of a series of physiological events. Initially, an individual will gasp in a panic reaction. Water may be inhaled into the **lungs** (aspiration). As the body responds to the emergency in a "fight or flight" reaction, the **breathing** rate will increase to such an extent that hyperventilation can occur. Many people will attempt to hold their breath to bring themselves under control. However, if relief from drowning is not found within a minute or so, breathing will necessarily have to commence. A further physiologic response to the presence of water is the spasming of the adductor muscles--the muscles that close the **vocal cords**. This phenomenon is termed laryngospasm. Laryngospasm can also occur when someone tries to eat and breathe at the same time, and is euphemistically described as having something "go down the wrong way." This closure occurs when something other than air enters the trachea. While closure of the windpipe does prevent further entry of water, breathing becomes very difficult. Thus, a cycle of spasm followed by forced opening of the trachea, further entry of water and spasming begins.

Entry of water into the lungs can produce several effects. If the water is salt water, the increased sodium and chloride concentration of the salt water, relative to the fluids in the body, can cause fluids to be sucked into the lungs, in an effort to equalize ionic concentrations. The result can be drowning in body fluids, which is termed pulmonary **edema**. When fresh water enters the lungs, large volumes can pass from the lungs to the **heart**. This causes the destruction of red blood cells (hemolysis) and release of potassium. The elevated potassium level can produce cardiac arrest (stoppage of the heart) or injury to the **central nervous system**.

Somewhat paradoxically, in many drowning victims the majority of water enters the lungs during the last few moments of life. Death is most typically due to larygospasm and the resulting blockage of air. As the victim becomes unconscious and the spasm reflex abates, water is able to pour into the lungs. Thus drowning can be "wet" or "dry" with respect to the water content of the lungs.